

SIGNALIZED INTERSECTION SAFETY STRATEGIES



Provide or Improve Left-Turn Channelization

WHERE TO USE

Signalized intersections where crashes related to left-turn movements are an issue.



DETAILS

This strategy includes the following: providing left-turn lanes, lengthening left-turn lanes, providing positive offset for left-turn lanes, providing positive guidance with channelization, and delineating the turn path.

Left-turn lanes allow separation of left-turn and through-traffic streams, thus reducing the potential for rear-end collisions. Because they provide a sheltered location for drivers to wait for a gap in opposing traffic, left-turn lanes may encourage drivers to be more selective in choosing a gap to complete the left-turn maneuver. Provision of a left-turn lane also provides flexibility in designing a phasing plan.

The design of the left-turn lane is crucial to its effectiveness as either a safety or operational improvement strategy. In providing left-turn lanes, vehicles in opposing left-turn lanes may block the respective driver's view of approaching vehicles in the through lanes. This potential problem can be resolved by offsetting the left-turn lanes.

Design criteria for selecting an appropriate left-turn lane length are presented in the AASHTO *Policy on Geometric Design for Highways and Streets*, the *TRB Highway Capacity Manual*, *NCHRP Report 279*, *NCHRP Report 457*, and the policies of individual highway agencies.

KEY TO SUCCESS

Keys to success in implementing left-turn lanes include the appropriate design of all elements (length, width, taper). Another key to success with left-turn lanes is to incorporate other strategies such as protected-only phasing.



ISSUES

Potential difficulties in providing a left-turn lane where it currently does not exist are the cost and acquisition of space required for the additional lane and the need to relocate the signal heads and hardware. The use of shoulders and/or parking lanes may be considered, but potential adverse safety concerns, such as lack of a shoulder for emergency stops, should be addressed. In addition, it will be important to address concerns from business owners or other stakeholders concerned about loss of parking.

TIME FRAME ●●●○

Improving or implementing left-turn lane treatments can range widely in time. Where no changes to existing pavement or no new construction is needed, implementation can take only weeks or months. Where redesign or restriping of approaches is performed, time may be longer depending on the need to reposition or change the location of traffic signal heads or other hardware and acquiring right-of-way.

COSTS ●●●○○

Costs of implementing or improving the design of left-turn lanes can vary. Where reallocation of available width by restriping is all that is needed, the cost can be relatively low. Where redesign and widening or other construction is necessary, costs will be moderate. Costs may include upgrading and/or relocating traffic signals and other hardware. Left-turn lane improvements that require right-of-way acquisition or major reconstruction can be high-cost projects.

EFFECTIVENESS

TRIED/PROVEN: Recent research has demonstrated the substantive safety effect of providing left-turn lanes. The safety effectiveness varies with the location (rural versus urban), number of legs, type of traffic control, and number of approaches for which the lane is installed. One study indicated crashes can be reduced up to 15% for rural three-leg intersections and 33% for rural four-leg intersections. The same study concluded that crashes may be reduced up to 7% at urban three-leg intersections and up to 19% at urban four-leg intersections. Another study indicated that crashes may be reduced up to 58% when a left-turn lane and turn phase are added.

COMPATIBILITY

This strategy can be used in conjunction with the other strategies for improving safety at signalized intersections.

SUPPLEMENTAL INFORMATION

Highway and other agencies should ensure that their design policies for new or reconstructed intersections incorporate consideration of all aspects of left-turn lane design and operation. Highway agencies should review their policies for left-turn warrants and design to consider explicit safety, capacity, and traffic operation considerations. Highway agencies may also wish to revise their standard intersection design details to accommodate offset left-turn lane treatments as their standard approach.

For more details on this and other countermeasures: <http://safety.transportation.org>

For more information contact:

FHWA Office of Safety Design
E71, 1200 New Jersey Avenue SE
Washington, D.C. 20590
(202) 366-9064
<http://safety.fhwa.dot.gov>

FHWA Resource Center - Safety and Design Team
19900 Governor's Drive, Suite 301
Olympia Fields, IL 60461
(708) 283-3545
<http://www.fhwa.dot.gov/resourcecenter>



U.S. Department of Transportation
Federal Highway Administration



Safe Roads for a Safer Future
Investment in roadway safety saves lives